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2020-07

Kröger , M & Nygren , A 2020 , ' Shifting frontier dynamics in Latin America ' , Journal of Agrarian Change , vol. 20 , no. 3 , pp. 364-386 . https://doi.org/10.1111/joac.12354

http://hdl.handle.net/10138/317095
https://doi.org/10.1111/joac.12354

Received: 5 August 2019 | Revised: 8 November 2019 | Accepted: 12 November 2019

DOI: 10.1111/joac.12354

ORIGINAL ARTICLE

Journal of Agrarian Change WILEY

# Shifting frontier dynamics in Latin America

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**Funding information**
Koneen Säätiö, Grant/Award Number: 4705967; Academy of Finland, Grant/Award Numbers: 1317319, 253680, 316725

## Abstract

The concepts of resource frontier and commodity frontier are often treated interchangeably. This article suggests the benefits of clarifying these concepts because frontiers remain important analytics for understanding drastic land-use changes and other socio-environmental transformations. Based on long-term field research in different parts of South and Central America, we use frontier concepts as heuristic devices to analyze heterogeneous frontier situations and make broader generalizations. Our synchronic and diachronic analyses of frontier dynamics elucidate different frontier modalities and shifting frontier expansions. The concept of commoditizing resource frontier is introduced to explain recent frontier-makings in Brazilian Amazonia and Cerrado and in the Nicaraguan Río San Juan. Although earlier frontier research took a short-term time perspective and created conceptualizations based on a single modality of a particular period, our longitudinal analysis shows that drastic changes and complex overlappings are the hallmarks of frontier dynamics.

**KEYWORDS**
agrarian political economy, Brazil, Central America, commodity frontiers, Latin America, resource frontiers

## 1 | INTRODUCTION

This article examines how multiple forest landscapes in Latin America, and the lived environments of the people inhabiting these territories, have been converted into "natural resources" to be appropriated as "resource frontiers" and

commoditized as "commodity frontiers." These frontier-making processes have created extensive agricultural areas and pasturelands and promoted the intensive extraction of timber, minerals, hydrocarbons, and other natural resources. While many frontiers are resource frontiers, where the main activity is the primary process of land appropriation and making nature exploitable, others have been turned into commodity frontiers, where resources are extracted for globalizing commodity markets as seen in the massive extraction of hydrocarbons in southeastern Mexico (Quist & Nygren, 2015) or the expansion of soybean plantations in Bolivian Gran Chaco (McKay & Colque, 2015). Although there is considerable speculation on land and other natural resources on resource frontiers, most of the resources are not intensively traded or value-added; rather, underlying this speculation are the ideological and political underpinnings of creating "natural resources" out of "nature" (Bridge, 2014). In contrast, the main driving force of commodity frontiers is large-scale commodity production for markets and the capture of abnormal rents, based on the capitalist logic of commoditizing everything and striving for increased profit-making and spatial expansion (de Waroux et al., 2018; Richards, 2015).

The aim of this study is to provide novel analytical conceptualizations of resource and commodity frontiers as heuristic devices for diachronic and synchronic analyses of shifting frontier dynamics in different Latin American contexts, as well as in other parts of the "global South." The land rushes and resource grabs of the late 2000s have given rise to lively academic debate about frontiers, particularly to address the expansion of frontier capitalism with its multifaceted socio-environmental frictions (Campbell, 2015; Lund & Rachman, 2018; Moore, 2014; Ybarra, 2016). In our view, there is an urgent need to sharpen the frontier as an analytical device to understand drastic land-use changes and other environmental-social transformations in resource-rich but political-economically "peripheral" areas in the global South. Based on our long-term, empirical research on land-use and landscape changes on different frontiers in South and Central America, we suggest that a better understanding of frontier-related concepts can help analyze these multifaceted frontiers and clarify their systemic features. As we will show in our analysis, there are common patterns on heterogeneous Latin American frontiers, which enable wider generalizations and abstractions on frontier dynamics.

Compared with scholars who have predicted decreasing rates of deforestation on Latin American frontiers in the near future (Cleary, 1993; Hecht, 2011; Thaler, 2017), we argue that most of these frontiers have varying modalities of opening, collapsing, re-opening, and closing, which need to be considered when trying to understand longer-term frontier dynamics. As we will show, abrupt changes in modalities are a norm rather than an exception on Latin American frontiers. We will illustrate how resource frontiers and commodity frontiers transform and sometimes overlap with each other as commoditizing resource frontiers in shifting socio-environments. Through this type of analysis, we seek to offer analytically robust conceptualizations of frontiers relevant to research fields interested in broad analytical questions explored through empirically situated analyses, including agrarian political economy, critical agrarian studies, critical geography, political ecology, and transdisciplinary studies on extractivism and land grabbing.

The next section explains the theoretical approaches relevant for understanding frontier dynamics, while the third section focuses on a conceptual analysis of resource frontiers, commodity frontiers, and commoditizing resource frontiers. The fourth section examines different modalities characteristic of Latin American frontiers, while the fifth section analyses socially differentiated actors and frontier politics in Brazil and Nicaragua. The final section provides conclusions on the common patterns, systemic changes, and complex overlappings typical of frontiers.

## 2 | THE POLITICAL ECONOMY BEHIND FRONTIER EXPANSIONS

Frontier expansions can be examined through political economy-oriented approaches, which, according to Foweraker (1981), include analyses of shifting modes of production, mechanisms of accumulation, and the expropriation of surpluses by particular actors, together with associated political and ideological interventions promoted by the state. In this study, we illustrate—through various Latin American cases—how frontiers are opened, how they advance, and how they may collapse and be re-opened again. We also show how forces driving these frontier-makings go beyond governmental authorities to private companies, transnational organizations, and environmental

and social movements, each of which seeks to have a say in the struggles over resources and representations on shifting frontiers (Bebbington & Bury, 2013; de Waroux et al., 2018; Rasmussen & Lund, 2018).

By analyzing long-term frontier dynamics, we will show the drastic changes and complex overlappings in frontier modalities. Media news and public attention tend to focus on contemporary conditions, overestimating successes at curtailing the deforestation associated with resource frontier openings. Such (mis)interpretations of the patterns of declining frontier expansions are also characteristic of many academic studies, with a tendency to downplay the significance of a resource frontier when its expansion rate wanes. Correspondingly, periods of rapid frontier expansion have often been interpreted from perspectives that see few or no possibilities to revert this trend. In our view, a deeper historicization of frontier dynamics can help us recognize that the landscape changes of contemporary resource frontiers may be as drastic as the changes in historical resource frontiers.

Our study provides a conceptual analysis of resource and commodity frontiers, including their historically changing booms and busts. We show how the characteristics of the frontiers vary depending on whether they are primarily resource frontiers, commodity frontiers, or a mixture of both and thus defined as "commoditizing resource frontiers." We focus on the frontiers' changing modalities of expansion by exploring continuities and changes in land use on different Latin American frontiers. This type of analysis offers valuable birds-eye views of the wider patterns in frontier dynamics, although it provides fewer possibilities for a detailed review of a particular frontier site.

The concepts of resource and commodity frontiers are useful in this analysis because they direct attention to physical changes in the landscape, including large-scale forest clearings that illustrate the speed and scale of land-cover alterations. At the same time, we emphasize that a frontier expansion often takes place through a patchwork. Such mosaic processes related to forest *degradation* and forest *fragmentation*, as well as to transformations in *land use* and changes in *land cover*, are difficult to reveal through macro-scale analyses that are based on high-resolution satellite images. We illustrate these more-detailed aspects of frontier-making and related processes of accumulation by dispossession through empirical examination of forest conversions in Amazonia and Cerrado, the two largest resource frontiers in Brazil, which are analyzed alongside the corresponding yet contextually differentiated dynamics of Río San Juan, the biggest resource frontier in Central America. The first author carried out intensive field research in the Brazilian Amazonia in 2005, 2007, 2011, and 2017–2018 and in the Cerrado southeast of Amazonia in 2011 and 2018. The second author carried out long-term ethnographic field research in Río San Juan, southeastern Nicaragua in 1996–1998, 2007, and 2017.

Frontiers are sociospatially heterogeneous areas as shown in earlier ethnographically oriented research (Li, 2001; Little, 2001; Nygren, 2004; Schmink & Wood, 1992; Tsing, 2005). This does not, however, mean that there are no systemic patterns in frontier dynamics. As McMichael (1992, p. 361) has suggested, historically oriented analyses should be formative rather than formal, as "social categories, including analytical units, are historically fluid in form and content. Therefore, they constitute an integral part of the inquiry itself… ." In our view, scholars who have questioned the usability of the frontier concept have tended to rely on a particular frontier modality, one that is too short and momentary to illustrate the long-term trajectories (Coy, Klingler, & Kohlhepp, 2017). What is needed, we argue, is a better analytical understanding of different frontier concepts and how these heuristic devices can sharpen our thinking of "what to look for" and "where to look for" it (Becker, 1998, p. 110) when trying to understand frontier dynamics as an empirical phenomenon.

Furthermore, most of the earlier studies on frontiers have concentrated on state-led smallholder colonization of a particular resource frontier (Browder et al., 2008; Godar et al., 2012). However, current frontiers are increasingly driven by capitalized agribusinesses, operating with less direct governmental intervention (de Waroux et al., 2018). For a better understanding of diachronic changes and synchronic overlappings in frontier dynamics, more careful conceptualizations of the central features of resource and commodity frontiers are needed.

One such feature is that frontiers have different modalities, during which they are opened, collapsed, re-opened, or closed. These modalities are not mechanical, but as we will show, there can be major changes occurring one after another, or overlapping alterations occurring simultaneously. Earlier studies focused on a particular frontier moment, and the expectation was that this moment will continue over time. Cleary (1993) claimed that the Amazonian frontier collapsed after the deforestation rates of the 1980s decreased and suggested that a frontier concept was not further

needed, while Hecht (2011) and Thaler (2017) presented overly optimistic views of the possibility of Brazil reaching zero deforestation in the near future. We argue that more complex analyses of resource and commodity frontiers, and their shifting modalities, are needed to understand frontier dynamics in sociospatially broader areas and temporally longer periods of time.

Recent scholars in political economy, political ecology, and other related research fields, including Campbell (2015), Eilenberg (2014), McKay (2018), Lund and Rachman (2018), Moore (2014, 2015), and Peluso and Lund (2011), have unravelled the ways in which "unused nature" is a physical and ideological condition of frontier expansion. Smith (2008) [1984]) conceptualized frontiers as a combination of material changes and capitalist fantasies, where alterations in the landscapes and relations of production are essential for the frontier to advance. According to such a view, frontiers arise from a capitalist logic of exploitation and commoditization (Moore, 2014) rather than from "civilization's" expansion into "barbarian" lands, as Turner (1920) argued in his classic "frontier thesis" related to the North American West. Violent processes of land appropriation, resource exploitation, capital accumulation, and social dispossession are central features of frontiers, and nothing less serious is occurring in the Brazilian Amazonia, Guatemalan Petén, Honduran Azacualpa, and Nicaraguan Río San Juan (Campbell, 2015; Gilbert, 2018; Middeldorp, Morales, & van der Haar, 2016; Nygren, 2004; Ybarra, 2016). Biophysical changes in landscapes and political-economic alterations in land tenure and modes of production are key mechanisms of capitalist value creation on the frontiers.

The complexities that critical political economy, world-ecology, and political ecology have identified as being inherent to capitalist value creation support our claim that resource frontiers must be conceptually distinguished from commodity frontiers. In brief, capitalist value creation operates by creating two types of relations: (a) socially differentiated positions based on "unequal rights and powers of people over economically relevant assets" (Wright, 2005, p. 14); and (b) "audacious fetishization of nature" (Moore, 2014, p. 5), which separates humans from the rest of nature in symbolic frontier-making. When combining these two interrelated aspects, it becomes evident that capitalism seeks to appropriate cheap land and cheap labor for resource exploitation and commodity harvesting on frontiers. As we will show in our analysis, frontiers are hosts to violent struggles over social position at sites of uneven access to resources and accumulation by dispossession (Harvey, 2003), where socially differentiated value-relations turn uncapitalized natures into sources of cheap raw material, labor, food, and energy (Moore, 2014, p. 2). However, such processes are not straightforward or complete because not all resources are renewable and because such trends are often negotiated and contested (Akram-Lodhi & Kay, 2012; Bebbington & Bury, 2013).

## 3 | CONCEPTUALIZING RESOURCE AND COMMODITY FRONTIERS

### 3.1 | Main characteristics

The concept of a resource frontier entails the notion that some kind of "free land" exists to be occupied, and this land is typically located on commons or state-claimed lands. On resource frontiers, resources are mainly exploited for land appropriation and resource speculation, while on commodity frontiers, strategic resources are turned into cheap resources to be traded with an upgraded value for capitalistic markets. Resource frontiers are also sites where properties are "conjured," which Campbell (2015) demonstrates in his study of the Brazilian Amazonia: Traditional resource rights are defined arbitrarily, which makes resource frontiers sites with rights to conquest. The framing of a particular area as a periphery, a void, and an empty land that is idle or underutilized—with potential wealth to be tapped—plays a crucial role in the political legitimization underlying the turning indigenous territories and other subaltern spaces into resource frontiers (Nygren, 2003; Tsing, 2005). After such framings come a series of acts (discussed below) that are characteristic of resource frontiers in Latin America as well as elsewhere in the global South.

In the first phase of a resource-frontier expansion, land-poor smallholders are often pushed to peripheral forest areas through state-induced settlement projects or other types of political-economic incentives. Local indigenous groups and/or non-indigenous forest-dwellers are either driven away or squeezed into the margins to make way for

the frontier expansion (Little, 2001; Schmink & Wood, 1992). The small-scale settlers are then urged to make "improvements" on the land through forest clearing for agriculture and thereafter made culprits for the environmental damage caused. The timber that is cut down is often burnt because the lack of roads makes it difficult to transport the logs to markets. When the soil fertility rapidly decreases after a few maize or rice harvests, especially in the humid tropics, speculative cattle raisers buy the land cheaply from the smallholders, who then move to a new frontier to carry out the arduous task of forest clearing once again. Often, behind the small-scale settlers are the large-scale land speculators, who finance the settlers' forest clearings through clientelistic arrangements, with increasing land prices in mind.

As the frontier advances, so do the illegal land grabbers, who work on the logic of abnormal land rents. They produce official-looking but legally questionable land deeds with the help of corrupt (semi-)officials, such as clerks in regional land registries and state bureaucracies handling public lands. The land grabbers try to sell the volatile land deeds quickly to other types of speculators, who expect land prices to increase as roads and other types of infrastructure are constructed for the growing population. The sales between the land grabbers and speculators, although illegal, produce documents used as a judicial-political basis to preclude the earlier landholders from making any claims for their customary, or de-jure, land rights. Typically, pasture is planted on such lands to create an image of land under production, and fences are constructed to indicate that the lands have owners with tenure rights. Hired gunmen often protect such lands from landless "encroachers"; they have the silent approval of government officials, who might themselves be involved in the business or too afraid to intervene. Most of these speculative ranches are not intensively managed, which makes their categorization as part of a commodity frontier difficult. This creation of non-value is characteristic of resource frontiers, although it is often hidden by political deals and discourses of "agricultural" frontiers used by lobby groups beyond the land grabs and speculation waves.

Resource-frontier expansion is simultaneously a material landscape-altering process and an ideological and fantasized project, during which local landscapes and livelihoods are drastically changed (Smith, 2003). The advance of a resource frontier has historically occurred through forest clearing for low-intensive agriculture or cattle raising, through which the would be land controllers try to convince the authorities that the occupied lands are theirs. Such ventures often contain few possibilities, or intentions, to produce commodities for markets, and for this reason, it is useful to distinguish resource frontiers, where the main goal is speculation to attain land tenure, from commodity frontiers, where the primary modus operandi is commodity harvesting for markets.

In general, there are two key mechanisms through which value is created on frontiers and has multifaceted impacts on forest cover and on the quality of life of local forest-dwellers. Moore (2014) emphasizes the appropriation of unpaid nature, first, through environmental destruction and second, through labor exploitation via a poorly paid workforce. The working conditions and remuneration of workers employed to expand frontiers are typically weak and insecure, and many kinds of labor and human rights violations occur. Poor working conditions and excessive labor exploitation are especially characteristic of resource and commoditizing resource frontiers, while the working conditions might be more variegated on commodity frontiers. However, both in Brazil and Nicaragua, many cases have been reported where people have been urged to seek work on commodity frontiers based on false promises that do not describe the existing illicit conditions, with dire labor right violations.

Appropriation and exploitation of nature and labor on commodity frontiers often coincide with complementary forms of capital accumulation, such as large-scale deforestation for soybean or oil palm plantations. However, a commodity frontier does not necessarily require forest conversion for agriculture or pasturelands and it may also thrive in forest areas, as illustrated by rubber gathering in the Brazilian Amazonia. Until the 1970s, the commodity frontier of rubber tapping operated in Amazonia primarily through the exploitation of the migrant and indigenous workforce. The forest was mostly left untouched, as was also the case after the rubber tappers gained independence from their patrons and began to sell rubber as a commodity by themselves. However, this type of non-deforesting commodity frontier is difficult to maintain in the capitalist world-ecology, where rubber gathered from a natural forest has to compete with rubber produced on plantations and with synthetic rubber. This observation coincides with Moore's notion that it is difficult to lessen the rate of exploitation without an increase in the appropriation of nature. Conversely, it is possible to generate wealth on a non-deforesting commodity frontier if the workforce is turned into a

"resource" to be appropriated, as the case of rubber barons accumulating massive wealth without destroying the forest suggests. Overall, a resource frontier refers to massive resource appropriation at the cost of human and extra-human lives and labor, while a commodity frontier refers to value-added market relations, where struggles over wages, the distribution of surplus, and the costs of reproduction are prevalent.

### 3.2 | Consecutive and simultaneous frontier dynamics

Figure 1 illustrates a situation where a resource frontier is expanding in an area considered an unused periphery, which has resources to be exploited and lands to be occupied. The figure also shows that a resource frontier often precedes a commodity frontier, with the former making way for the latter. On both the South and Central American resource frontiers, there are areas where land speculators cut down the forests several years ago, left the lands unproductive with only a few heads of cattle grazing on them, and later sold these speculative lands to commercial soybean or tropical-fruit producers, who then turned the lands into verified forms of private property while transforming the resource frontier into a commodity frontier through commercial soybean and fruit production.

Resource and commodity frontiers are, however, not mutually exclusive; they can also expand simultaneously. The partial overlapping of the two arrows in Figure 1 illustrates a situation where resource speculation and resource commoditization coincide. This occurs, for example, when forest areas inhabited by Rama Indians in Río San Juan are grabbed and cleared for oil palm plantations, dispossessing indigenous forest-dwellers by capturing de-facto and de-jure control over the land while beginning the intensive production of palm oil for markets.

Figure 2 illustrates a situation of a "mature" frontier, where resource exploitation and landscape changes on resource and commodity frontiers have turned part of the lands into a post-frontier, indicating the exhaustion of possibilities to claim local environments as "unused resources" to be appropriated and exploited. Post-frontier thus refers to a situation where most of the land has been marked for particular use often through changes that are hard to reverse, for example, turning primary forests into vast monoculture plantation enclaves. Sometimes post-frontier contexts also created by politically imposed land-use restrictions and establishment of protected areas through "fortress conservation" (Nygren, 2003). An example of this type of post-frontier situation is the case of Rôndonia in Amazonia, where the frontier has been partly closed by land speculation and resource commoditization and partly by the creation of set-aside zones, including multiple-use conservation areas. In this situation, cattle capitalists, logging mafias, mining operators, dam builders, and plantation owners are moving to new frontiers in the neighboring states of Amazonas and Acre while also seeking to re-open the politically closed conservation areas in Rôndonia. As the arrow in Figure 2 shows, such operators often gain the power and capital for their expansions on new frontiers from their activities in established post-frontier settings.

Frontier closure thus refers to those areas in the post-frontier patchwork that are closed off from exploitation either through resource exhaustion or political regulation, while frontier collapse refers to a situation in which lands cleared for activities such as cattle raising are left fallow and turn into secondary forests. The possibilities of resource exploitation are thus not exhausted on collapsed frontiers; rather, there are latent possibilities for frontier re-opening, such as in the form of soybean or oil palm plantations. Technological advancements and fluctuations in global commodity prices and markets often spur the re-opening of collapsed frontier sites. Such is the case in many hydrocarbon and mineral extraction frontiers, where once-exhausted oil wells and low-mineral content mining sites are re-opened based on new drilling technologies and new commodity booms of previously unprofitable minerals. Such boom-bust cycles are important factors in explaining how and why frontier modalities change from opening to collapse and re-opening.

These dynamics become clear in Nicaragua, where a resource frontier was advancing in the 1980s in the regions of Chontales and Nueva Guinea, north from Río San Juan. When most of the unoccupied lands had been appropriated and cleared for agriculture and cattle raising, thus creating the conditions of a post-frontier, the resource frontier advanced in the early 1990s to the area of El Castillo in Río San Juan, which had strong support by speculative cattle raisers from the post-frontier areas. Currently, the resource frontier of El Castillo is reaching the boundaries of

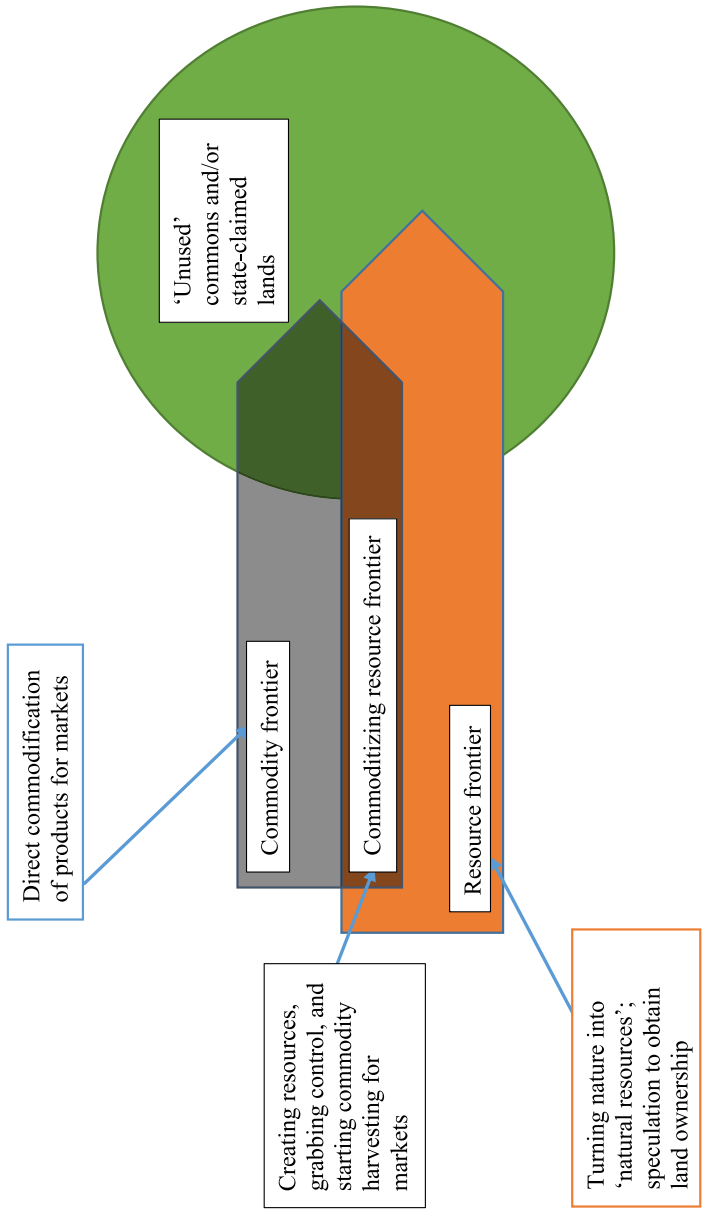


**FIGURE 1** The expansion of resource and commodity frontiers

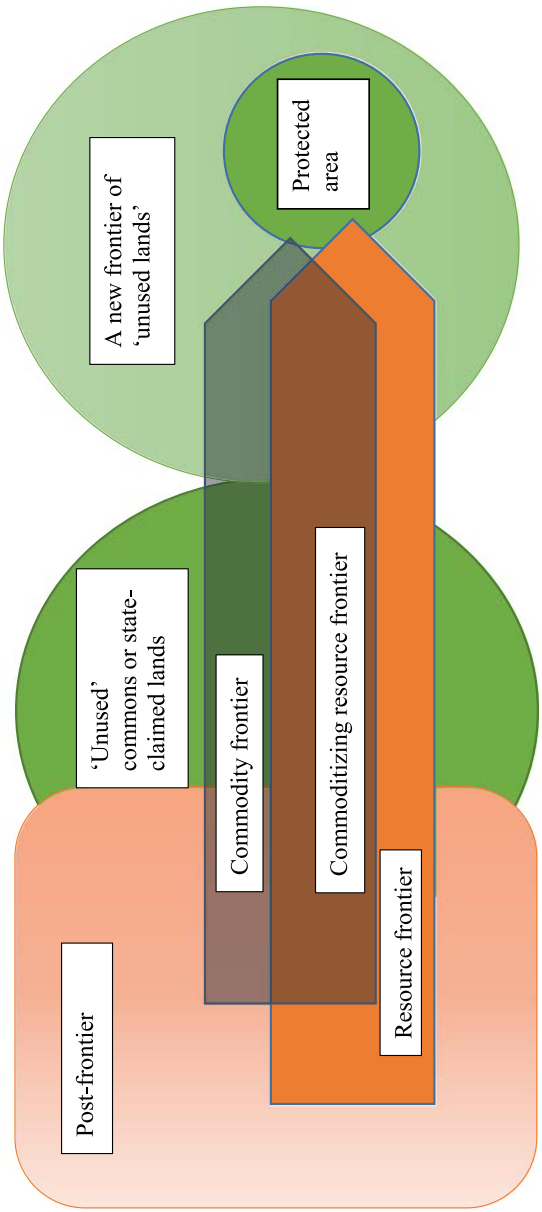


**FIGURE 2** Expanded resource and commodity frontiers and creation of post-frontier spaces

the biological reserve of Indio Maíz, a strictly protected 2,640 km$^2$ forest area established in 1990, while El Castillo is reaching the conditions of a post-frontier and presents with few lands available for resource appropriation and forest clearing.

The broader advance of the commoditizing resource frontier in comparison to the "mere" resource frontier in Figure 2 illustrates a situation where the traditional logic of resource speculation and land appropriation is accompanied by forest clearing for commodity production. A commoditizing resource frontier typically produces more value than the speculative resource frontier if the costs of investment are covered by the prices paid for the new commodities. These dynamics are unfolding, for example, in Amazonian Acre, where the current key decision-makers are vowing to turn huge areas into large-size soybean plantations (Kröger, 2019). Correspondingly, in Río San Juan, Nicaragua, the resource frontier of El Castillo has recently been turned into plantations of African oil palm and fast-growing tree species; there are currently approximately 6,350 ha of oil palm plantations and 3,850 ha of gmelina (*Gmelina arborea*) and teak (*Tectona grandis*) in the area, representing almost 10% of the land use in the region. This change has transformed the resource frontier of El Castillo into a commoditizing resource frontier and partly into a commodity frontier.

Such dynamics are characteristic of many frontiers today, as the time span between deforestation and occupation of the cleared areas by capitalized agribusinesses is becoming increasingly short. How this happens depends on the commodity produced and on the prevailing environmental conditions. In any case, the frontier expansion is increasingly driven by clearing the "unused" forests directly or with a shortened resource-frontier period for large-scale production of commodities through capitalized agribusinesses (de Waroux et al., 2018). In Acre, a resource frontier with extensive cattle capitalism is advancing within the Chico Mendes Extractive Reserve, and this tendency is expected to expand to other conservation areas and indigenous territories. Still, although 80% of deforested lands in Amazonia are currently under pasture, this does not mean that "primitive cattle capitalism" has the most capital and power in Brazil (Kröger, 2019). Rather, several experts stated in our interviews that soybean agribusiness, which occupies 15% of the deforested lands in the Amazonia, has more power than cattle capitalism. This power difference seems to be encapsulated in the differentiation between a commodity frontier of soybeans versus a resource frontier of pasturelands.

There is a general tendency for commodity frontiers to advance over old, speculatively held resource frontiers. This situation characterizes the buffer zone of Indio Maíz in Río San Juan, where the oil palm and tree plantations of capitalized corporations are advancing at the expense of extensive cattle raising. The fast-growing tree plantations require relatively little labor while providing fairly rapid returns. Furthermore, in certain cases, growing trees for commodity markets seem to have links to money laundering. As in Amazonia and Cerrado with soybeans, the corporations operating palm-oil and tree plantations have much more capital and power in Río San Juan than do the extensive cattle raisers.

In some cases, a commodity frontier may advance through direct commoditization of forest resources without land clearing for agriculture. Illustrative examples are traditional rubber-tapping and Brazil nut-gathering activities in Amazonia, traditional extraction of plant extracts in the Cerrado, and traditional extraction of chicle (*Manilkara zapota*), rubber, and raicilla (*Psiychotria pecacuanha*) in Río San Juan. Although these activities did not deforest the areas in question, they commodified the local resources by creating markets for non-timber forest products (NTFPs). Recently, some of these NTFPs, including medicinal and cosmetological extracts, high-quality natural rubber, and "superfoods" such as açai (*Euterpe oleracea*), have been linked to high-value niche markets and global value webs. Simultaneously, many of these products have begun to be increasingly produced in tree plantations or agroforestry systems rather than in natural forests.

Other examples of direct commoditization of forest resources without deforestation include REDD+ schemes and "green grabbing" through the creation of areas for nature conservation and ecotourism (Büscher & Fletcher, 2015). In Río San Juan, Nicaragua, there are several privately owned conservation areas and ecotourism operators, while a whole new market for "ecological compensation" has been created in the context of Brazil's 2012 New Forest Code, which allows for the compensation of deforestation by investing in conservation or forest

restoration somewhere else. This situation has led to green grabs and to soybean planters searching for remote areas for REDD+ compensation deeper in the Amazonia. These types of direct commoditization of forest resources, even if they do not promote imminent deforestation, can have considerable effects on local livelihoods and labor conditions, shifting forest valuations towards monetary value and bringing capitalist labor relations into forest-related activities.

Sometimes, intensive harvesting of commodities for markets leads to a situation where a commodity frontier shifts to a new resource frontier or to a commoditizing resource frontier, as shown in Figure 2 by the movement of a resource frontier arrow on top of a commodity frontier arrow. Such transformations can be noted in some of the multiple-use conservation areas in Acre, where a new resource frontier of logging and forest clearing for cattle raising is advancing into protected areas and replacing the traditional commodity frontier of rubber gathering. The same holds true in Río San Juan, where a traditional commodity frontier of commercial raicilla cultivation under forest cover has been replaced by a resource frontier of forest clearing for speculative cattle raising.

In our view, distinguishing between resource frontiers and commodity frontiers provides heuristic devices to understand how particular areas fluctuate between these two types of frontiers. In Pará, Amazonia, the Tapajós-Arapiuns Extractive Reserve (RESEX) was established in the late 1990s as a result of the mobilization of 20,000 *ribeirinhos* (traditional riverside extractivists), who, with the help of the National Rubber Tapper's Council (CNS), argued for an official declaration of their 647,600 ha living area as an Extractive Reserve to protect their usufruct-right forests from the hostile expansion of illegal loggers and would-be ranchers. However, according to CNS-affiliated activists, the RESEX has recently been captured by logging mafias, who allow "sustainable community logging" within the reserve. During the 2018 fieldwork, the first author noted a change in mentality among the RESEX leaders, who referred to the reserve based on the monetary value of the standing trees and who campaigned for their "sustainable" logging. This change is illustrative of a diachronic shift, whereby a speculative resource frontier with high rates of deforestation is closed for 20 years based on the extractive reserve but then abruptly re-opened in the form of a commoditizing resource frontier. The prices paid for legal timber are much higher than the prices of illegally cut logs, and thus "legal" logging acts as a major driver of forest degradation on this commoditizing resource frontier. If this process advances, it can be expected that legal logging, serving as window dressing, will give way to the underlying interests of cattle raisers, soybean cultivators, and mining operators who seek to clear the RESEX forests.

Rather than suggesting a linear model of frontier expansion, we argue that frontiers often advance in the form of a patchwork from multiple directions and through multiple means. The shifts from a resource frontier scenario to a commodity frontier or a post-frontier scenario are porous processes, and different patches of land are typically involved in different dynamics of transformation. In Río San Juan, the biological reserve of Indio Maíz was established in 1990 to slow down deforestation in this rainforest area, which is considered a hotspot of global biodiversity. Recently, the commoditizing resource frontier has reached the edges of the Indio Maíz reserve, and according to the latest satellite images, hardly any primary forest remains outside of this officially declared biological reserve. Furthermore, increasing forest clearing is occurring within the reserve. In the early 2000s, fifteen families lived without permission within the reserve, whereas in 2017, this estimate was 300 families, most of whom have been driven there by organized land speculators and land brokers, with the silent support of politicians involved in the business (second author's databases, 2017). Another issue that has facilitated the advance of the resource frontier within the reserve is that in 2016, hurricane Otto destroyed approximately 7,300 ha of forest within the reserve, which made the conversion of these lands for extensive cattle raising relatively easy. Some of the illegal cattle raisers, with links to large meat processors in Nicaragua, have claimed hundreds or thousands of hectares of land within the reserve. The worst scenarios estimate that the reserve will be turned into extensive pasturelands in the near future.

As our analysis shows, these types of transformations can only be captured through a detailed diachronic analysis, while a combined synchronic analysis makes it possible to understand the heterogeneity of the situations and the

overlapping trajectories that occur simultaneously. Overall, complex causes are turning large areas in Latin America as well as other areas in the global South into post-frontiers either through the advancement of a resource frontier, a commodity frontier, or both. As we will illustrate next, these transformations rarely take place in a linear fashion; rather, there are modalities in the frontier dynamics that need to be carefully considered.

## 4 | FRONTIER MODALITIES: OPENING, COLLAPSE, RE-OPENING, AND CLOSURE

In this section, we illustrate how frontiers, whether resource or commodity frontiers, do not advance linearly through time and space or deterministically follow previous paths of expansion in shifting resource politics and global markets. We demonstrate these dynamics by analyzing the rates of deforestation in the Brazilian Amazonia and Cerrado, and in Nicaraguan Río San Juan. In all of these cases, deforestation has been closely linked to the expansion of resource and commoditizing resource frontiers. Through our analysis, we illuminate how frontier-makings connect with particular policies and particular times that frame certain areas as peripheries, whose abundant resources should be appropriated or whose "free" or "unproductive" (forest) lands should be used more effectively.

The term resource frontier was adopted by the Brazilian government in the First National Plan of Development (PDA 1972–1974), which presented Amazonia as a periphery to be integrated into national development. The second PDA (1975–1979) marked the Amazonia even more strongly as a resource frontier to be exploited and supported government-induced mineral extraction in the Carájas mining complex in particular. This PDA also used the term "tropical frontier" to indicate that there were "free" areas to be occupied (Marques, 2007). Such governmental interventions in Amazonia largely collapsed in the 1980s–1990s due to the debt crisis, the reconstitution of the state, and increasing resistance by local people, after which the frontier expansion became more private in character.

Figure 3 tracks the annual forest loss in Brazilian Amazonia since 1977 and in the Cerrado since 2001, with shifting frontier modalities.[1] The Cerrado deforestation is mainly attributed to soybean, sugarcane, eucalyptus, maize, and intensively managed pasturelands, indicating the advance of a commoditizing resource frontier and commodity frontier, while the Amazonian deforestation is linked to extensive cattle raising and thus to the advance of a resource frontier, although the post-2005 deforestation also has links to a commoditizing resource frontier through soybean production. Overall, Figure 3 shows the shifting modalities with abrupt changes and up-and-down swings, characteristic of frontier dynamics.

Nevertheless, several important aspects remain unrevealed by these types of macro-scale figures. First, Figure 3 does not demonstrate where in the Amazonia or Cerrado forest clearing has taken place, and the deforestation rates within both of these huge areas vary dramatically. Second, the figure does not show what type of land use replaced the forests: it mainly illustrates the land-*cover* changes rather than detailed land-*use* alterations, for which a more thorough in situ analysis is needed. For example, the relative weight of soybean production as a driver of forest clearing both in the Cerrado and Amazonia increased markedly after 2005, as the "primitive" forms of deforestation through illegal logging and pastureland expansion were increasingly banned by the Workers' Party-led policies. Third, the forest degradation and forest fragmentation affected by selective logging, mining, and other types of resource extraction, which are crucial activities on commodity frontiers, are not detected in these types of figures. Fourth, the establishment of new conservation areas and areas with REDD+ schemes, where the resource frontier cannot advance in theory, are not explicitly shown in the figure.

[1]Source for the Amazonian figures: the Brazilian National Institute of Space Research (INPE) and the United Nations Food and Agriculture Organization (FAO) dataset, http://rainforests.mongabay.com/amazon/deforestation_calculations.html. Sources for the Cerrado figures: http://combateaodesmatamento.mma.gov.br/, "Meta de Redução do Desmatamento no Cerrado." Data for years 1977–1986 is an average estimate, as there were no yearly figures.

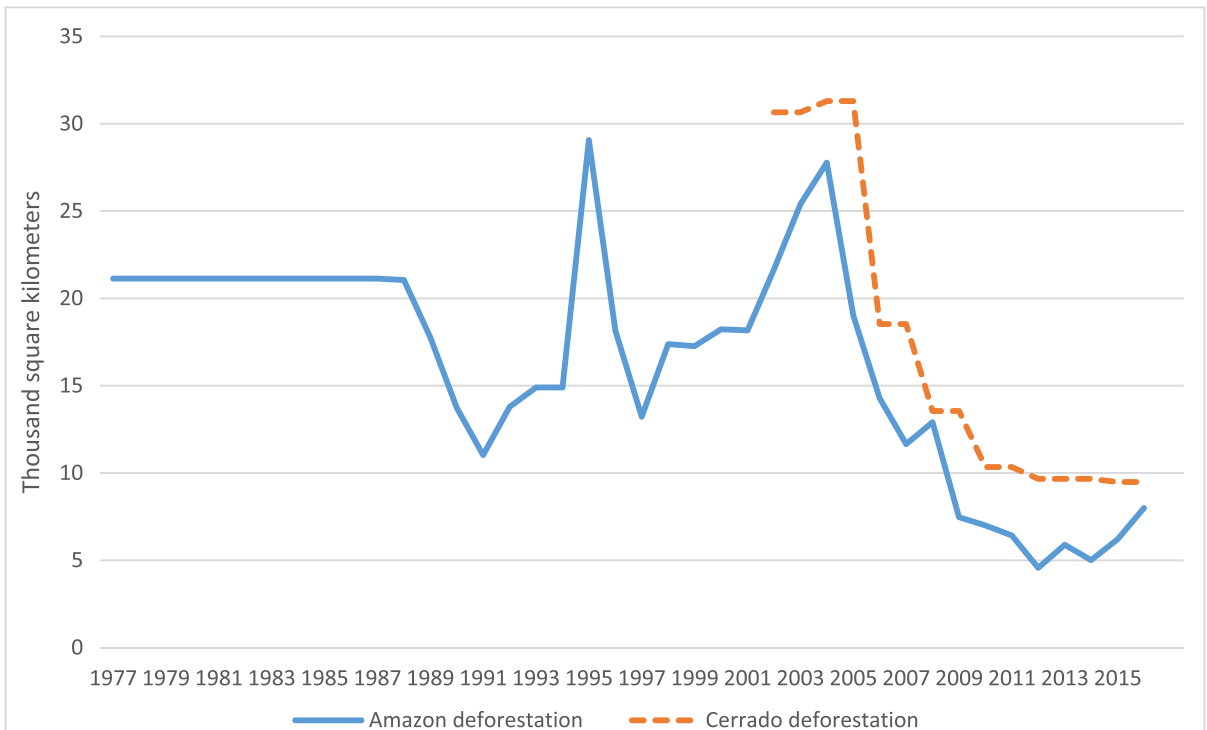


**FIGURE 3** Annual forest loss in the Brazilian Amazonia and Cerrado

Nevertheless, Figure 3 reveals hard-to-predict ups and downs in frontier expansion. While between 1970 and 1976, the annual average forest loss in Amazonia was 6,500 $km^2$, in 1977–1987, it was three times higher, approximately 21,000 $km^2$ (first author's calculation on the INPE and FAO data). These numbers suggest that in the 1970s–1980s, there was a modality of frontier expansion in the Amazonia. Furthermore, as Figure 3 shows, the Amazonian frontier was opening between 1977 and 1987, collapsing (in terms of the expansion pace) between 1988 and 1991, re-opening in relative terms between 1992 and 1995, and then collapsing between 1996 and 1997. The frontier was re-opened again between 1998 and 2004 and then collapsing between 2005 and 2008, while the modality of exceptionally low deforestation rates between 2009 and 2014 could be considered a period of frontier closure. This trajectory of development relates to the creation of several conservation areas in the 2000s, which made it difficult to re-open the frontiers located at the edges of these areas. Nevertheless, this finding does not indicate that this trend could not be changed, and throughout time, jumps from one modality to another have been observed on both the Cerrado and Amazonian frontiers.

What our analysis further notes is that the frontiers not only have varying modalities but also advance in various territories simultaneously. Over half of the Cerrado's primary forests, covering approximately a fifth of the Brazilian territory, have been destroyed within fifty years (Mansur, 2017). As Figure 3 shows, from 2001 to 2015, deforestation was more intensive in the Cerrado than in the Amazonia, and there was a general downward trend until 2010. Interestingly, this downward trend halted in the Cerrado in approximately 2010, and the annual forest loss remained thereafter at the level of $10 \times 10^6$ $km^2$. The impact of a closure seems to be relevant here; currently, compared to the Amazonia, the Cerrado more strongly presents the conditions of a commodity frontier due to its commercial soybean production.

In brief, Figure 3 suggests three key findings. First, the downward deforestation trends in the Amazonia and Cerrado support the claim of a general modality of frontier closure during the Lula governments (2003–2010). Second, a relatively larger frontier expansion has occurred in the Cerrado since 2005 than in Amazonia, which has stricter forest-clearing restrictions. This justification of Cerrado deforestation is curious considering that the Cerrado "holds around 5% of the world's biodiversity, including over 800 bird species," and of the "more than 11,000 plant species" in the Cerrado, "nearly one-half are found nowhere else on earth."[2] It seems that similar frontier-making discourses that created the Amazonian resource frontier in the 1970s, legitimized the expansion of the Cerrado soybean commodity frontier in the 2000s. Third, the advance of the Cerrado commodity frontier since 2000, which seems to have displaced *much* of the pressure for soybean, eucalyptus, and sugarcane plantations away from the Amazonia, suggests that the Amazonian frontier modality is likely to change to one of rapid re-opening once the Cerrado frontier reaches the closure stage. According to Nolte et al. (2017) and Spera et al. (2016), stricter control of deforestation in the Amazonia has led farmers, land speculators, and governmental programmes to target Cerrado forests since the 2000s. This trend supports the claim that the Amazonian resource frontier was collapsing in 2012–2014, when Lula's policies closed access to several frontiers by granting de-jure rights to local forest-dwellers (Kröger & Lalander, 2016). In fact, there has been a major re-opening of the Cerrado frontier since 2015, when the Brazilian government started the Matopiba development project. Consequently, the Cerrado frontier expansion was four times higher in Matopiba in 2015–2016 than in the Arc of Deforestation, the area with the highest deforestation rates in Amazonia (Mansur, 2017). This re-opening allowed agribusiness operators to boast that Brazil is able to simultaneously curb Amazonian deforestation while dramatically increasing agricultural production.

Concerning the case of Río San Juan, Nicaragua, Figure 4 illustrates the change in the area under forest cover since 1983 on the resource frontier of El Castillo in relation to the simultaneous change in the area under annual cropping, cattle raising and scrubland, and under corporate oil palm and tree plantations. The figure demonstrates drastic alterations and dynamic overlappings in the deforestation rates and land-use transformations on Río San Juan frontier as observed in Amazonia and the Cerrado. Significant modality changes are observed, including a rapid

[2]http://wwf.panda.org/what_we_do/footprint/agriculture/soy/soyreport/soy_and_deforestation/the_cerrado/.

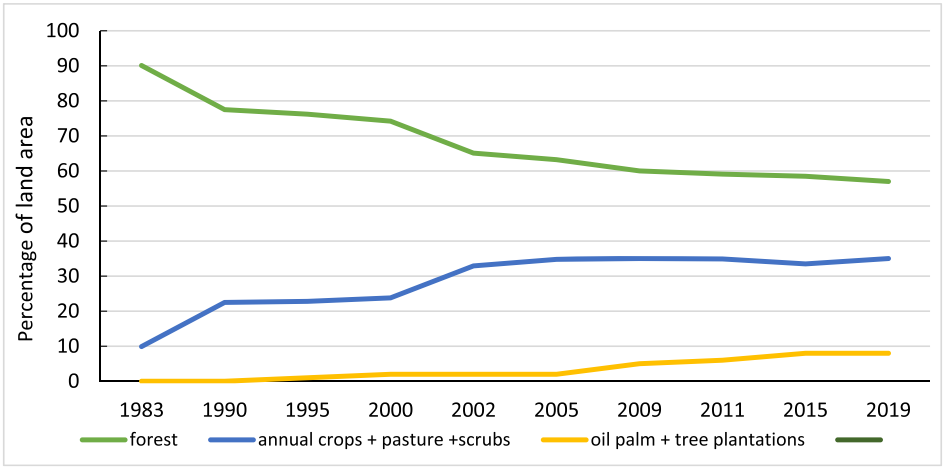


**FIGURE 4** Area under forest cover; under annual crops, pasturelands and scrubs; and under oil palm and tree plantations in percentages in El Castillo, Río San Juan, Nicaragua, 1983–2019

resource frontier opening in 1983–1990, a protracted frontier opening in 1990–2000, an accelerated frontier opening in 2000–2002, and a collapse in 2002–2005. Since 2005, the resource frontier has been increasingly replaced by a commoditizing resource frontier of oil palm and tree plantations in the buffer zone, while the resource frontier has moved to the protected reserve of Indio Maíz.

Nevertheless, several aspects that are crucial to understanding the shifting frontier dynamics in Río San Juan are not explicitly illustrated in Figure 4 but rather revealed through detailed ethnographic field research. In the 1970–1980s, the resource frontier was advancing in Nueva Guinea, north of Río San Juan, for slash-and-burn agriculture and extensive cattle raising, with strong links to land speculation. When this speculative frontier was closing in the mid-1980s, the resource frontier moved to the zone of El Castillo in Río San Juan. However, the relative pace of deforestation slightly decreased in several parts of El Castillo in 1983–1990 because this area was one of the most intensive zones of fighting during the Nicaraguan civil war. To prevent the advance of the Counter-Revolutionary army, the government displaced 1,400 peasant families from their forest homesteads into government-established settlements, while thousands of people sought refuge in Costa Rica. These relocations reduced the relative intensity of the primary-forest clearing in the area; instead, the deforestation concentrated on the secondary forests near the government-established settlements (Nygren, 2003). Without the fear of assault, the deforestation rate of primary forests would probably have been even higher during this period.

In the 1990s, Nueva Guinea had largely changed to a post-frontier, while the advance of the resource frontier intensified in El Castillo through forest clearing for annual cropping and extensive cattle raising. During this post-war period, the population rate skyrocketed in the zone, as relocated smallholders returned to their homesteads and thousands of landless people from other parts of Nicaragua sought to live on this resource frontier. According to the National census, the population of El Castillo was 5,100 in 1985 and 9,730 in 1995, while it was 19,864 in 2005 and 33,326 in 2015—population growth of 553% in 30 years.

In 1990, the biological reserve of Indio Maíz was established in the eastern part of Río San Juan, and the area of El Castillo was declared the buffer zone of the reserve. Related to this declaration, since 1995, dozens of international development cooperation projects, especially from Denmark, Austria and Spain, worked in the area to reduce the rate of deforestation and promote smallholder agroforestry in the buffer zone. Despite these efforts, the area under forest cover declined from 85% in 1983 to 33% in 2010 on this resource frontier, with the modality of rapid opening (second author's calculations from the development project's databases). What Figure 4 does not reveal is that amidst the decreasing area under forest cover, there was simultaneously a significant change in forest quality. In

1983, approximately 90% of the forests in the buffer zone were dense, primary forests; in 2010, more than half of the remaining forests were highly fragmented, secondary forests.

Plantations of oil palm and fast-growing tree species have gained a significant role as a driver of accumulation on this frontier since 2005, as shown in Figure 4. This was the time when many of the international development projects left the area, and thus it was easier for capitalized corporations to obtain permits from the Nicaraguan Ministry of Natural Resources to change the land use for intensive agribusiness. Most of the primary forests had already been cleared in this buffer zone. Thus, the advance of agribusiness did not increase the rate of deforestation directly; rather, its effect on local environmental conditions and livelihoods was mainly indirect, including (a) transformation of secondary forests and scrublands for oil palm and tree plantations, (b) appropriation of smallholders' lands for corporate agriculture, (c) intensive use of fungicides and pesticides, with significant effects on soil and water quality, and (d) turning the resource frontier into a commoditizing resource frontier and partly into a commodity frontier through intensive production of palm oil for global markets. Recently, some chocolate companies have bought lands from small-scale cacao cultivators in several parts of Río San Juan, with the aim of establishing their own cacao plantations in the zone. This will probably further intensify the advance of a commodity frontier in the area.

Under these conditions, hundreds of smallholders have sold their lands to agribusiness corporations since 2005, and many of them sold at low prices, under increasing pressure, and through informal mechanisms due to the lack of a land title. Thereafter, these smallholders sought work as low-paid agricultural laborers because options for a resource frontier to advance were no longer available in the buffer zone. Rather, the resource frontier has reached the edges of the strictly protected Indio Maíz reserve, which cannot be appropriated "legally." However, since 2000, an increasing number of cattle raisers have illegally occupied the reserve, many with links to large meat-processing companies in the capital (Fundación del Río et al. (FdeR), 2019; Ríos & Mendoza, 2017a, 2017b). According to the most pessimistic surveys, 44% of the land within the Indio Maíz reserve has been transformed for agriculture and pastureland (Fundación del Río et al. (FdeR), 2018), and the speculative resource frontier is advancing rapidly within the reserve under the current, scantly transparent, authoritarian-populist government of Ortega.

The recent deforestation in this frontier area is mainly indirectly linked to the advance of oil-palm and tree plantations, whose operators have been buying the already-cleared pasturelands from small-scale settlers at a low price. Some of these smallholders have thereafter moved to the reserve to clear the forest for low-intensity cattle raising, while others search for work as agricultural laborers. The deforestation in the area since 2005 has thus mainly concentrated on the biological reserve, not on the buffer zone, where the plantations are operating. However, based on the fact that according to Nicaraguan legislation, land use in the buffer zone should be based on small-scale agriculture, agroforestry and community forestry, it is strange that the government has granted permissions for the expansion of oil-palm plantations in this buffer zone.

In fact, oil-palm plantations have affected local environments and livelihoods in Río San Juan through both mechanisms mentioned by Moore (2014). First, through large-scale environmental degradation related to forest clearing, soil erosion, and water contamination, and second, through aggressive displacement of small-scale farmers and exploitation of the local workforce. In the interviews conducted by the second author, local residents reported that many people escaped the harsh working conditions in the plantations, either by searching for unoccupied land within the reserve or by looking for fairer working opportunities in the neighboring country of Costa Rica. Every year, thousands of people from Río San Juan leave for temporary work on coffee fields and sugarcane plantations in Costa Rica.

What remains unclear in the cases of Amazonia, the Cerrado, and Río San Juan as well as in many other Latin American frontiers is whether the more or the less "primitive" phase of frontier accumulation is more capitalist. In our view, both phases—sometimes following each other, sometimes overlapping—are part of the wider expansion of frontier capitalism. What is important to recognize is that unhistoricized analyses make it difficult to reveal the abrupt changes and multiple overlappings in frontier dynamics. In the following sections, we analyze the political-economic power relations that help explain the modality changes on frontiers and how landscapes and land uses transform on shifting frontiers.

## 5 | RESOURCE POLITICS AND FRONTIER DYNAMICS

A detailed analysis of the politics behind frontier dynamics opens up possibilities for further clarification of frontier concepts as heuristic devices. One of the key mechanisms in frontier openings in Latin America is the creation of class relations, together with a strengthening of state power. In Brazil, authoritarian state capitalism allowed for violent frontier expansion in the 1970s–1980s. However, in the early 1990s, certain scholars started to argue that it is unlikely that state capitalism would continue frontier expansions, with their claims based on the abrupt abandonment of state-subsidized mega-development projects in many parts of Latin America. Cleary (1993, pp. 335, 349), for example, argued that the Amazonian frontier was collapsing and that "the frontier has become meaningless as an academic construct."

However, when analyzed in terms of today's globally rampant land grabs (Borras, Jr. et al., 2012; Edelman, Oya, & Borras, 2013), the frontier seems to be anything but a meaningless analytical concept, especially if we conceptualize resource and commodity frontiers as arenas for capital accumulation taking place via resource appropriation and social dispossession. Furthermore, immediately after Cleary's claim, deforestation rates in Amazonia rapidly increased, leading to record highs in 1995; thus, the assumed collapse did not last. During the Temer government (2016–2018), there was a re-opening of frontiers based on the weakening of rules for environmental protection, while Bolsonaro's election in 2018 was a clear sign of powerful, authoritarian-militarist strategies to (re)open Amazonian conservation areas and indigenous territories for resource and commodity frontier expansions.

A corresponding situation holds true in Nicaragua. At the end of the civil war in 1989, large conservation areas were established in Río San Juan, including the biological reserve of the Indio Maíz. To gain local support for the protection of the reserve, a series of rural development projects were launched in the buffer zone; in 1994–1998, thirty projects were underway in Río San Juan with a total budget of $21 million USD. The projects included agricultural diversification, agroforestry, community forestry, and environmental education, with financing from various international development aid agencies and NGOs (Nygren, 2004). However, most of the development projects left the area in the late 2000s, when the Nicaraguan government of Ortega started to be blamed for authoritarian governance and massive corruption.

As is common on resource frontiers, resource rights and land claims were chaotic in Río San Juan, with violent struggles over access to and control of strategic resources. However, the situation was exceptionally violent in Río San Juan because, ever since the peace agreements in 1990, a considerable number of refugees and internally displaced people had returned to their farms, while the flow of new colonists dramatically increased. Furthermore, in return for abandoning their arms, the government promised large land areas on this frontier to those who had served the Sandinista or Contra army. Many of these demobilized people were given ownership of land already possessed by the smallholders, which expanded the number of persons who had ownership claims on the same plot of land. These conditions promoted a high number of land conflicts in the 1990s and 2000s.

Since the late 2000s, Ortega's government has promoted oil palm, tropical fruit, and fast-growing tree plantations in Río San Juan. Currently, the oil palm plantations occupy 10% of the land area in the buffer zone of El Castillo, which means that oil palm plantations have displaced 160 peasant households from their lands (Fundación del Río (FdeR), 2011). Nevertheless, the governmental discourses blame the smallholders for forest clearing and environmental degradation in the area. Despite the official rhetoric to protect the reserve of Indio Maíz as the "Lungs of the Earth" and "Mother Earth," hidden governmental support has been provided for land occupation and forest clearing within the reserve, including plans for road construction.

Furthermore, since the early 2010s, Ortega has promoted intensive extraction of oil, gold, minerals, and tropical timber in southeastern Nicaragua, as well as the construction of an Inter-Oceanic Canal linking the Atlantic and the Pacific Oceans (López Baltodano, 2014). According to the Ortegan government, the canal would create hundreds of thousands of jobs and double the country's gross domestic product in 15 years. In 2013, the National Assembly of Nicaragua granted a concession right to a Chinese company, Hong Kong Nicaragua Canal Development (HKND), to

build the canal and operate it for the next 50–100 years, despite the fact that dozens of scientists and other experts have warned of the project's ecological risks, economic costs, and effects of social dispossession (Chen, Zeng, & Deng, 2016; Wade, 2016). In addition to the canal, these plans also include new ports on both ends of the canal, artificial lakes in the mountains to ensure that the canal has enough water, and islands in Lake Nicaragua to dispose of excavated sediment and rock (Zach, 2015). The canal will not affect the frontier areas of Río San Juan directly; however, migration waves of smallholders, who fear that the state will expropriate their lands for canal construction, can already be noted in Río San Juan. Hundreds of farmers and activists opposing canal construction have been killed in recent years.

Figure 5 illustrates how the resource frontier has advanced in Río San Juan since the early 1980s and the changes in the forest cover amidst the expanding resource frontier, commoditizing resource frontier, and the consequential post-frontier. The map demonstrates how the advance of the frontier has taken place through a patchwork and how the frontier moved to the protected area of Indio Maíz after the scarcity of forest areas in the buffer zone of El Castillo. The analysis of frontier politics combined with an ethnographic interpretation of what these changes

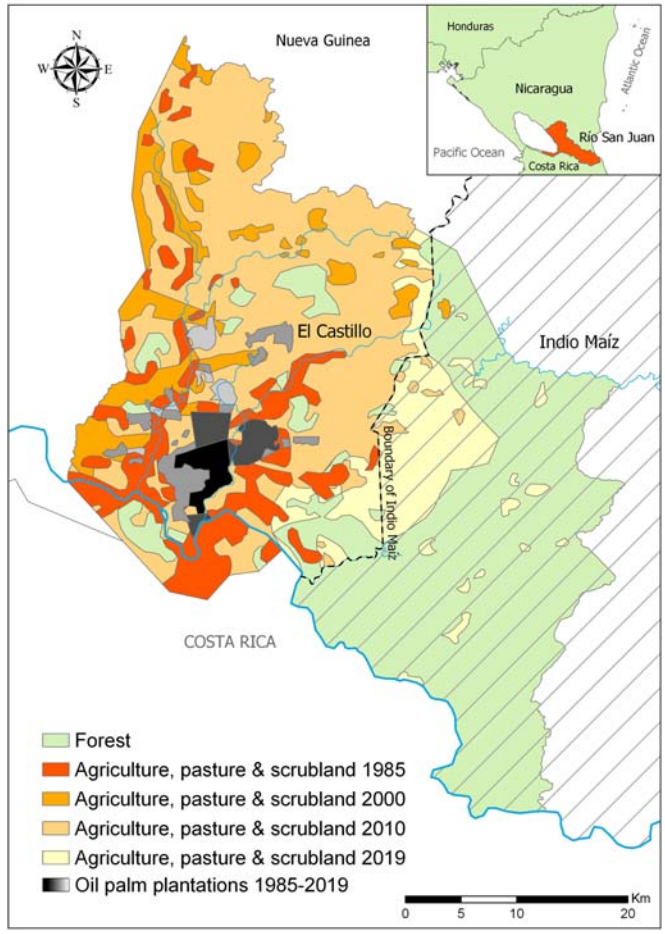


**FIGURE 5** The frontier advance in el Castillo, Río San Juan, Nicaragua in 1985–2019. Accumulated forest loss for agriculture, pasture, and scrubland, as well as for oil-palm plantations, since 1985–2019
(Sources: Datasets and analyses by "Bosques del Mundo" and the "Manejo Sostenible en la Zona de Amortiguamiento en el Municipio del Castillo" (MAS) Project)

have meant in terms of transformations in local landscapes and livelihoods opens up possibilities for a more thorough understanding of the environmental-social changes involved.

The second author's ethnographic interviews with representatives of governmental institutes, private companies, development projects, NGOs, and environmental-social movements, as well as with heterogeneous groups of local residents, revealed Río San Juan to be a dynamically shifting frontier, with multifaceted negotiations and contestations. As such, it has offered possibilities for expansive resource appropriation and rapid profit-making for speculative cattle raisers and agribusiness operators, while provoking traumatic experiences of violence and social dispossession and feelings of loss and abandonment among small-scale settlers. In the late 1990s, some of the smallholders were able to benefit from the commoditizing resource frontier expansion, as several development cooperation projects facilitated their access to value-added fair trade and other fine cacao markets in Europe. However, later on, many of these cacao producers either lost their lands to oil palm operators or their opportunity to capture a large enough share of the value-added cacao markets. As is common on many frontiers, politically powerful and economically better-off landowners and foreign companies have been able to capture most of the rents produced on this commoditizing resource frontier in relation to new niche markets for fine cacao. The resource frontier and commoditizing resource frontier expansions in Río San Juan demonstrate the frontier dynamics of multifaceted entanglements of legality and illegality and environmental destruction and social dispossession, where governmental policies support agribusiness-oriented landowners at the expense of traditional forest-dwellers and small-scale settlers.

These changes have close links to wider political dynamics between the state, corporate, and resistance actors (Kröger, 2013). Both Brazilian and Nicaraguan land grabs are carried out by investors of domestic and foreign origin (Ríos & Mendoza, 2017a, 2017b; Sauer & Leite, 2012), while at the same time, large areas have been set aside for protection by the state. According to Hecht (2011), the deforestation-curbing policies diminished Brazil's rate of deforestation by more than 70% from 2004 to 2011, during which time 7.8% of the Amazonian land was set under environmental protection, indigenous reserves were established on 20% of the Amazonian territory and $15 \times 10^6$ ha of multiple-use conservation areas were created. These endeavors placed 40% of the Amazonia under some sort of protection, with 60% under community management.

Governments remain the key players in agrarian policies as suggested by the rising and falling deforestation rates following governmental changes. In both Brazil and Nicaragua, governments have been unwilling to enact agrarian reform, although such reform could ease the pressure on frontier advancements (Domingues & Bermann, 2012; Fernandes, 2009; Fundación del Río (FdeR), 2011). However, this agenda is not in the interests of the elite, who seek to expand frontiers to perpetuate the cycle of conjuring property and creating abnormal land rents. By 2012, the elites in Brazil had seen that their possibilities to expand their power through the opening of new resource and commodity frontiers had been seriously curbed. The large conservation measures in Amazonia were emblems of the increased power of socio-environmentalists; meanwhile, the depleting "free" lands in the Cerrado brought the situation closer to a frontier closure.

However, underneath these factors promulgating a frontier closure, processes also occurred that increased the power of those wishing to open up new frontiers, and they included the neodevelopmentalist policies started by Lula and augmented by Dilma. In 2010, the Lula administration launched the second phase of the Project for Acceleration of Growth (PAC), a 620 billion € governmental initiative, with a focus on energy generation and resource extraction. Socio-environmentalists were not happy: in 2013, the Brazilian Landless Rural Workers' Movement (MST) charged that the agrarian policies of the Dilma government had been "the worst in Brazil since the Geisel government" (Brasil 247, 2013) of the 1970s, when money was spent on infrastructural development across Amazonia, while paralyzing the distributive land reform. During the Dilma government, the Amazonian frontier expansion was supported via ventures that mirrored the 1970s developmental model, including the building of dams, roads, and railways, the establishment of pig iron, steel, and aluminum plants, and the expansion of pasturelands, oil-palm, and soybean plantations (Hall & Branford, 2012; Kröger, 2017). The 2018 elections, where Bolsonaro received most of the votes from the new frontier regions, show that this move supported an augmentation in the constituency living off frontier expansion, a front on which Bolsonaro

had much more to offer than the Workers' Party. The Bolsonaro government is opening new frontiers and seeking to privatize the state-funded development projects and their outcomes, while the Landless Movement and the Workers' Party have been largely cast aside in what critics call a parliamentary-judicial coup, following the contentious impeachment of Dilma in 2016 and the arbitrary imprisonment of Lula in 2018.

While frontier closure seemed to be a possibility for those talking about Brazil reaching zero deforestation in early 2010, the events thereafter have shown the need for a much deeper political-economic analysis of lingering, structural power relations and shifting policies. Nevertheless, when talking about such phenomena as ending frontier expansion, it is often forgotten what this would mean in practice. In theoretical terms, the closure of the resource frontier can be seen as the exhaustion of the physical expansion of capitalism in a particular landscape. This can occur before or after the majority of the lands have been converted into agribusiness or resource extraction. Fearnside (2008, p. 11) suggests a pre-emptive frontier closure as a way to diminish the deforestation. However, current policies in both Brazil and Nicaragua centered on developmentalist ideologies, mega-investment projects, and legal settings of impunity that allow for corruption and environmental destruction do not facilitate this kind of alteration.

In both countries, capitalistic expansion has in fact been made stronger by strategic state support for extractivist corporations, such as meat-processors and pulp-production plants in Brazil (Kröger, 2012, 2017) and, in Nicaragua, the expansion of oil palm and fruit plantations, as well as meat and palm-oil processing plants. While environmental protection has increased in some areas, decision-making is skewed and political-economic power is concentrated in the hands of a small group of well-connected capitalists and elite politicians (Campos, 2017; Lazzarini, 2011). In the simultaneous processes of frontier closure and capitalist strengthening, several resource frontiers are being reopened both in Brazil and Nicaragua by dismantling former protected areas and indigenous territories, which are steps that no one imagined a short while ago.

The class structure promoting such frontier expansions and the developmentalist ideologies sanctioning them have been fortified in recent years. In the first author's interview of September 29, 2017, President Dilma Roussef argued that "the destruction of the largest protein company of the world, JBS … was anti-patriotic." Referring to the meat-producing JBS as a "protein company" and to the curbing of its power due to corruption investigations as "anti-patriotic" hints at the underlying developmental ideology. These discourses hide the multifaceted ecological-social impacts of massive deforestation and justify Brazil's growing meat production and consumption. While evidence is mounting that the corruption investigations against the Workers' Party governments were politically motivated and partisan, Dilma's reaction to them reveals key aspects of the political-economic power her government was supporting. The above metaphor illustrates the power of discourses in legitimizing the idea that the establishment of commodity frontiers is essential for the country's economic development while hiding the dubious process by which JBS was made a large player in such policies. However, at the same time, it is important to note that unlike Bolsoenaro or Temer, both Lula's and Dilma's governments supported the socio-environmentalists' attempts to curb the deforestation.

In all the cases analyzed herein, frontier advancements have clear consequences in other regions as well, including the neighboring countries. Brazilian frontier policies have impacts in Bolivia, Paraguay, and other parts of South America, as the soybean and cattle sectors are increasingly coupled both geographically and sectorally. When a particular territory or sector is being targeted by conservation measures, ranchers and soybean producers move to neighboring countries and to different sectors to pursue capital accumulation (Gasparri & de Waroux, 2015). Similarly, oil-palm and tropical-fruit plantations expand their operations in different Central American contexts based on changing environmental rules and labor regulations in particular countries. These leakages and couplings demonstrate that resource and commodity frontiers are becoming increasingly complementary, expanding through commoditizing resource frontiers that are based on flexible accumulation across sectors. It seems that capitalism is deepening in Latin America along with the search for faster ways to turn a greater amount of money capital into commodity capital, and it has drastic environmental-social effects throughout the continent.

## 6 | CONCLUSIONS

This study has examined the frontier dynamics of key resource and commodity frontiers in South and Central America, including Amazonia and the Cerrado in Brazil and Río San Juan in Nicaragua. We have argued that resource and commodity frontiers should be conceptualized more clearly, with definitions that reflect the differences between these two terms. With the resource frontier, we refer to primitive and speculative processes of land appropriation and forest clearing and the cognate political underpinnings through which the lived environments of local forest-dwellers are framed as unused lands. A resource frontier expansion often includes land grabbing and is associated with deforestation, expansion of pasturelands, and fencing to conjure property and create speculative land markets and official-looking land titles for come-from-behind investors.

The later-arriving oil-palm, soybean, tropical-fruit, and tree-plantation operators seek to transform a resource frontier into a commodity frontier by turning resources of the pioneering zones into "natural resources" to be tapped and commoditized to (globalized) markets. When land appropriation and resource commoditization occur simultaneously, we speak of a commoditizing resource frontier. Sometimes, a commodity frontier expands without a prior phase of a resource frontier or an imminent deforestation, such as in the case of intensive hydrocarbon extraction, NTFP-commoditization, or expansion of ecological compensation markets. Massive land appropriation and resource commoditization often lead to a situation where a resource frontier or a commodity frontier turns into a post-frontier. In such circumstances, there are no more substantial, untitled commons or state-owned lands to be occupied and opened for agriculture or intensive resource extraction. If possible, the frontier then expands to another region, often with economic and political support from powerful stakeholders operating on the near-by post-frontier.

Our study has also offered analytical strategies with which to explore shifting frontier modalities in terms of opening, collapse, re-opening, and closure. When deforestation in some areas decreases rapidly, conventional analyses have often claimed that the frontier has collapsed or that the deforestation problem has been resolved. However, our study has shown that a longer-term analysis based on diachronic and synchronic examination typically reveals more abrupt changes and varying modalities. Simultaneously, we have claimed that although frontiers are contextually differentiated and socio-politically heterogeneous, by using the heuristic tools suggested herein, it is possible to generalize common patterns and systemic cycles that are characteristic of different frontiers. As we have demonstrated, frontier-making is a physical and imaginative project that promotes large-scale changes in local environments and livelihoods, even if it expands as a patchwork.

We have also analyzed the politics and power involved in frontier expansions and the socially differentiated resource distribution involved. Many frontiers in Latin America are currently being incorporated into forest clearing and market expansion based on the following agendas: (a) capitalist accumulation, (b) restoration of political and economic control by powerful foreign and national actors, and (c) the wish to raise the global position of certain corporations by creating low costs for land accumulation, resource extraction, energy generation, and associated infrastructure construction, which are all subsidized by the state. A strong push is also coming from (d) a partial shift to a "green economy," in which large-scale flex-crop plantations are central.

In both countries analyzed here, the earlier socio-environmentalist era has been recently supplanted by post-environmentalist ideologies. In Brazil, these policies promote large frontier expansion in Amazonia and the Cerrado. To do this, the Bolsonaro government seeks to cut away the power vested in the environmental conservation and institutional recognition of indigenous territories held by socio-environmentalists that prevents resource frontier expansion. The same holds true in Nicaragua, where the Río San Juan frontier is advancing within the strictly protected Indio Maíz reserve, while the earlier resource frontier in the buffer zone is changing to a post-frontier. All these expansions are supported by the prevailing authoritarian-populist governments. The ability of local forest-dwellers and smallholders, in alliance with transnational movements, to create contentious agency to counter the tendency to delimit local residents' resource rights will be essential in the future trajectories of many of the Latin American resource and commodity frontiers.

Our study demonstrates the concepts of resource frontier and commodity frontier as highly relevant heuristic devices to understand the dynamics of forest clearing, land speculation, illegal occupation of protected areas, and forest fragmentation, all of which are linked to a resurgence of authoritarian governance and frontier capitalism led by a (re-)emerged landed elite-government nexus in many parts of Latin America, as elsewhere in the global South. At these tension points, novel perspectives are needed on frontier penetration, resource commodification, unequal resource appropriation, and capitalist surplus accumulation. Any foreseeable frontier closure requires a U-turn in policies; however, such a turn is unlikely under the current regimes, which water down forest conservation and biodiversity protection laws and limit the budgets and initiatives of environmental authorities and civil-society groups to counter the current drive for deforestation and resource grabbing on multiple frontiers.

## ACKNOWLEDGMENTS

This article draws on research funded by the Academy of Finland (projects 253680, 316725, and 1317319) and the Kone Foundation (4705967). We are grateful to the residents of the Brazilian Amazonia and Cerrado and Río San Juan, Nicaragua for their valuable co-operation with our field research. We also thank the governmental institutions, private sector representatives, NGOs, and environmental and social movements that provided useful knowledge. We would like to thank two anonymous reviewers of the *Journal of Agrarian Change* who provided valuable comments on the earlier version of the manuscript. Special thanks to the "Forests of the World" organization and the "Manejo Sostenible en la Zona de Amortiguamiento en el Municipio del Castillo" (MAS) project for their great help in the datasets and in the analysis of the land-use data of Río San Juan. We would also like to thank several colleagues for their comments on parts of prior versions of this article, including Timo Kaartinen, Marcos Pedlowski, Anu Lounela, Tuomas Tammisto, Sergio Sauer, and Carlos Santana. We also thank Ohto Nygren for performing map drawing.

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**How to cite this article:** Kröger M, Nygren A. Shifting frontier dynamics in Latin America. *J Agrar Change*. 2020;20:364–386. https://doi.org/10.1111/joac.12354